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# Clip applicator

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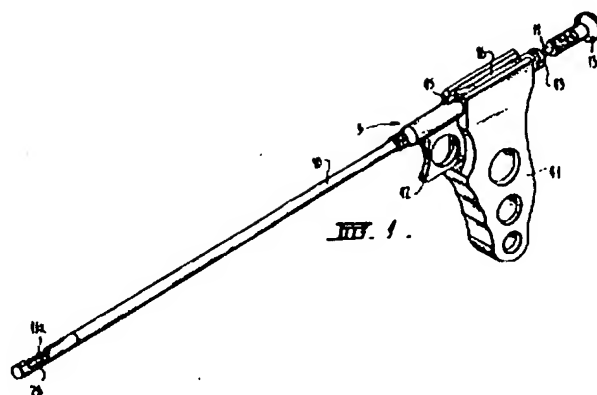
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## Abstract of GB2054384

A tubal ligation device for actuating a clip adapted to be positioned in a relatively inaccessible position such as in a human body, said clip including a body and a hinged member biased to an open position by a spring movable between two positions on said body, one position basing said hinge member to an open position and a closed position in which it may clamp an object, said device including an elongated tube housing at least two actuating devices adapted to engage a clip mounted on said tube at or near one end thereof, a handle on the tube at or near the other end of said elongated tube, each of said actuating devices including devices engageable and operational by a person holding the handle in the manner of a pistol grip such that an inserted clip hinge member can be opened or



closed and said biasing spring can be moved to said second clamping position by said actuating device, the arrangement being such that the ligation device can be operated solely by the fingers of the hand holding the device by the handle.

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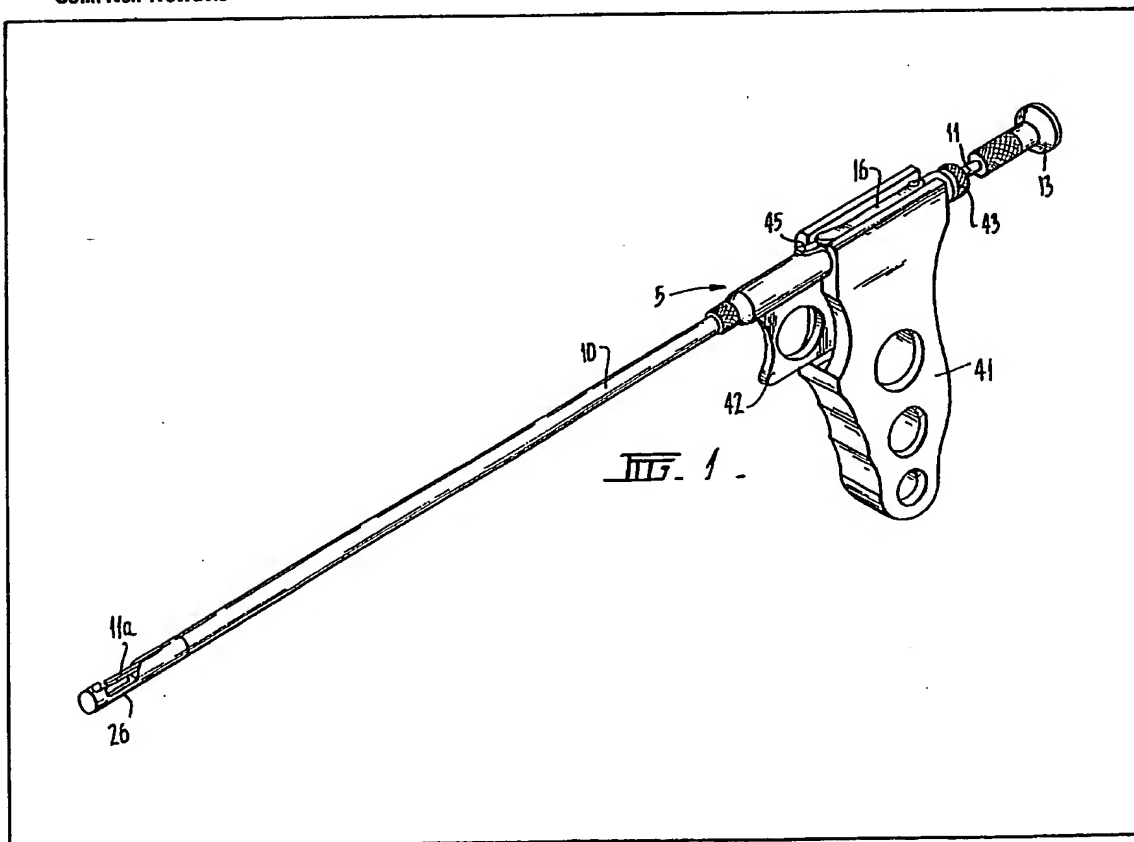
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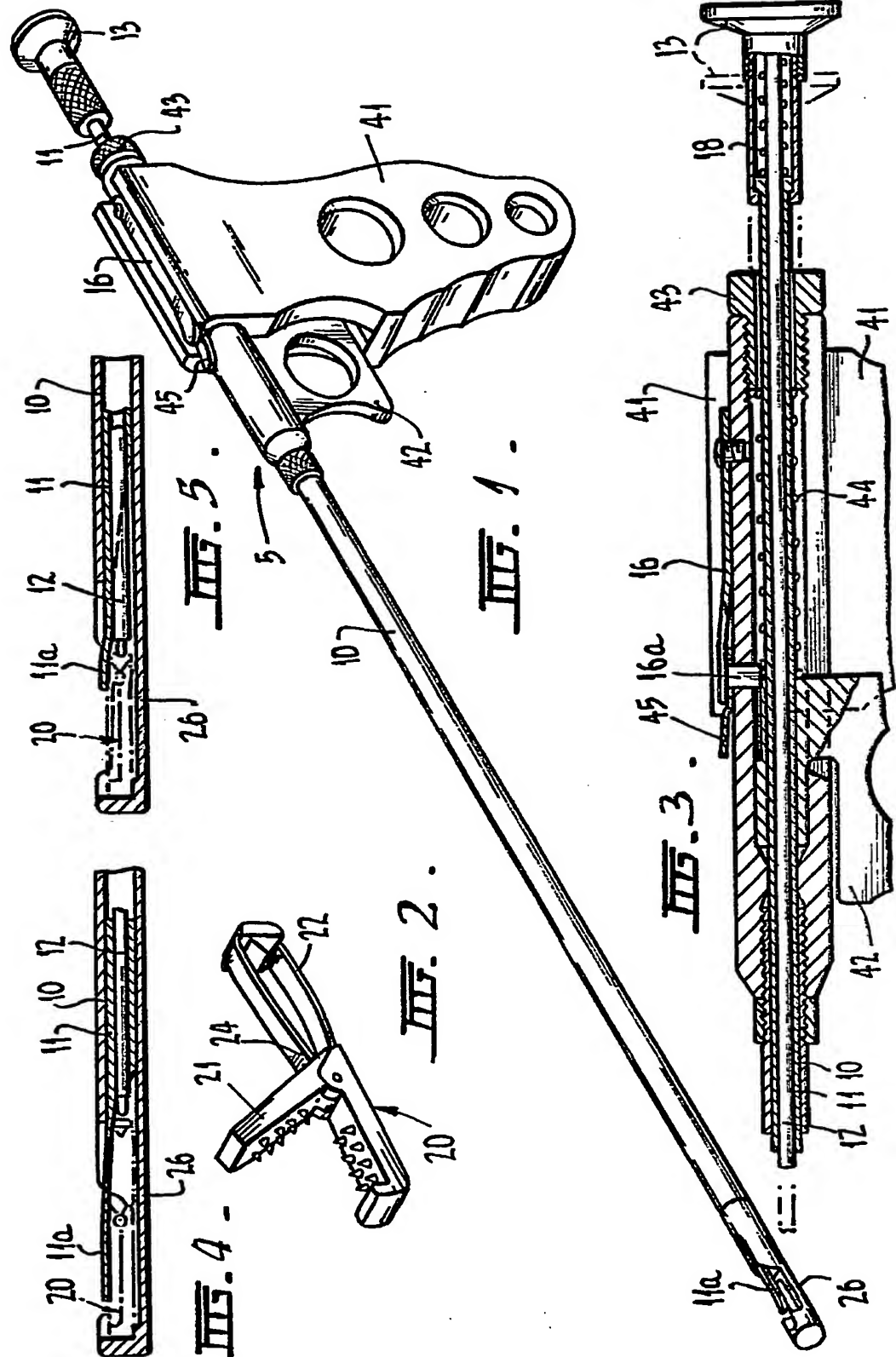
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(57) A tubal ligation device for actuating a clip adapted to be positioned in a relatively inaccessible position such as in a human body, said clip including a body and a hinged member biased to an open position by a spring movable between two positions on said body, one position biasing said hinge member to an open position and a closed position in which

it may clamp an object, said device including an elongated tube housing at least two actuating devices adapted to engage a clip mounted on said tube at or near one end thereof, a handle on the tube at or near the other end of said elongated tube, each of said actuating devices including devices engageable and operational by a person holding the handle in the manner of a pistol grip such that an inserted clip hinge member can be opened or closed and said biasing spring can be moved to said second clamping position by said actuating device, the arrangement being such that the ligation device can be operated solely by the fingers of the hand holding the device by the handle.







## SPECIFICATION

## Improvements relating to a tubal ligation gun

5 The present invention relates to a tubal ligation gun which has particular application in clamping of fallopian tubes in female humans. The procedure to close the fallopian tube is quite common nowadays and now involves in its simplest form the use of a  
10 small clip which is placed over the fallopian tube during an operation and closed to clamp the tube shut.

Clips of this type are described in U.S. Patent Specification 4,112,951 assigned to the Research Corporation. In U.S. Patent Specification No. 3,882,854 also assigned to Research Corporation there is disclosed an applicator or laparoscope which includes a pair of slidable actuators one of which is adapted to close the clip jaws and assists in  
20 correctly locating the clip, whilst the other actuator is adapted to position the U-shaped spring of the lip in a jaw closing position. Whilst it is imperative that the clip is safely held in the applicator in the course of an operation until the clamping step is finished it is also  
25 important that the operation of the applicator gun is simplified as much as possible.

The present invention has as its object to provide apparatus which will simplify the procedure of inserting and closing the clip. It will be appreciated  
30 that the clip may be used in various applications as a clamp for holding various pieces of animal tissue.

There is provided according to the present invention a tubal ligation device for actuating a clip adapted to be positioned in a relatively inaccessible  
35 position such as in a human body, said clip including a body and a hinged member biased to an open position by a spring movable between two positions on said body, one position biasing said hinge member to an open position and a closed position in which it may clamp an object, said device including an elongated tube housing at least two actuating means  
40 adapted to engage a clip mounted on said tube at or near one end thereof, a handle on the tube at or near the other end of said elongated tube, each of said actuating means including means engageable and operational by a person holding the handle in the manner of a pistol grip such that an inserted clip hinge member can be opened or closed and said  
45 biasing spring can be moved to said second clamping position by said actuating means.

Conveniently the actuating means for engaging said hinge member on the clip is a tube slidable in said elongated tube and movable against said spring bias in response to pressure applied to an associated  
55 lug slidably mounted adjacent said handle. Said tube is spring biased to a hinge closing position. The actuating tube is adapted to be positioned such that the clip is held in position at the end of the elongated tube with the hinge member open. The actuating tube can be moved further back to allow insertion  
60 and removal of the clip from the outer elongated tube. Preferably the actuating tube is actuated by a

slidable trigger member at the hand end for convenient single finger actuation.

65 The movable spring on the clip is positioned at one end of the clip for location axially of the elongated tube for engagement by an actuating ram slidably mounted in the actuating tube. The ram is actuated by pressure applied by the thumb of the operator.

70 The actuating ram extends back to the handle and can be conveniently engaged by the thumb of the hand holding the handle to push against the spring and move it over the jaws of the clip and firmly clamp the jaws in their closed position. Thus there is  
75 no need for threaded interengagement and actuation by either component in use and the device can be actuated by the fingers of the hand holding the device by the handle.

80 The invention will be described having reference to the accompanying drawings in which:-  
Figure 1 is a perspective view of the applicator;  
Figure 2 is a perspective view of a typical clip;  
Figure 3 is a sectional view of the handle end of the  
85 applicator tube;

Figures 4 and 5 are sectional views of the clip holding end of the applicator;

Figures 6 and 8 show operational sectional views of the handle end of the applicator;

90 Figures 7 and 8 show operational sectional views of the clip holding end of the applicator.

Referring to Figures 1 and 2, the apparatus 5 includes an elongated tube 10 slidably housing an inner actuating tube 11 and an actuating ram 12. The  
95 end of elongated tube 10 includes an abutment housing 26 for housing a clip 20. The tube 10 is threadably fitted into a cylindrical barrel 40 fixed within the handle grip 41. The actuating tube 11 has fitted to it a trigger 42 housed in slots in the handle grip 41 and the barrel 40. The actuating tube 11 and associated fittings are secured within the barrel 40 by threaded  
100 nut 43. A compression spring 44 provides a bias against the actuating tube 11 tending to maintain the finger extension 11 projecting into the abutment housing 26. The trigger 42 is slidable to move the actuating tube 11 and finger extension 11a rearward  
105 against the spring bias. The finger extension 11a is adapted to engage the hinged member 21 of the clip 20 so that relative sliding of the tube 11 will close the member 21 or allow it to open out as shown in phantom outline in Figure 9.

The finger 11a of tube 11 is positioned such that the clip 20 is held in position even when the hinged member 21 is open. Movement of tube 11 in a rearward direction towards the handle by squeezing of  
115 the trigger allows insertion or removal of a clip from its housing in the elongated tube 10. This is best shown in Figure 9.

Referring to Figure 2, this Figure shows the clip 20 in more detail. The hinged member 21 is pivoted about pin 23 and includes a foot 24 which engages bias spring 22 so that the member 21 is biased to an open position. The ram 12 is adapted to abut on spring 22 and slide it along the clip thereby closing

the hinged member 21 and the ends of the spring are housed in recesses (not shown) to maintain the clip clamped shut. The clip is described in more detail in U.S. Patent No. 4,112,951.

5 Referring to Figure 3, the actuating ram 12 is slidably mounted in the actuating tube 11 and extends from the other end of elongated tube 10 to end in a thumb-piece 13. the ram is spring loaded at 18 to return it to its original position when released.

10 The lug or trigger grip 42 is connected to actuating tube 11 for slidable movement against the pressure of spring 18. When the trigger 42 is released the finger 11a of the tube 11 moves over the hinged member 21 to close the jaws of the clip 20.

15 A leaf spring 16 is provided with a lug 16a to contact the surface of tube 11 and is adapted to contact shoulder 17 as the tube is moved back. This marks the extent of movement of the tube to indicate that the hinged member 21 is able to open. In a desirable form of the invention, further movement of the tube 20 11 can only continue if it is desired to allow removal of the clip 20 from its housing. This is carried out by pressing down on detent 45 which acts to lift lug 16a away from shoulder 17 and allow further movement back through the actuating tube 11.

25 In operation a clip 20 is positioned in the housing at the end of the elongated tube 10 as shown in Figure 3. The lug 14 is then released and the finger at the end of tube 11 closes over the hinged member 21 and encloses the clip.

30 The operation of the device is best described with reference to the closing of a fallopian tube in a human female, however, other uses are envisaged.

The fallopian tube is accessible *via* a canal inserted 35 into the patient. The elongated tube housing the clip is of sufficiently small dimension to be insertable into the canal in known manner. Also in known manner the surgeon may locate the fallopian tube and after pulling the actuating tube 11 back to the notch 17 the hinged member 21 opens and allows 40 the clip to be placed over the tube whence the actuating tube 11 is released and closes the hinged member 21 over the tube to clamp it. The surgeon can then operate the ram 12 by pressing the thumb-piece 13 to slide the spring 22 over the clip as described earlier. Finally the tube 11 is drawn completely back to allow removal of the clamping clip from the device.

The device may be operated with one hand only.

#### 50 CLAIMS

1. A tubal ligation device for actuating a clip adapted to be positioned in a relatively inaccessible position such as in a human body, said clip including a body and a hinged member biased to an open position by a spring movable between two positions on 55 said body, one position biasing said hinge member to an open position and a closed position in which it may clamp an object, said device including an elongated tube housing at least two actuating means adapted to engage a clip mounted on said tube at or near one end thereof, a handle on the tube at or near the other end of said elongated tube, each of said actuating means including means engageable and operational by a person holding the handle in the 65 manner of a pistol grip such that an inserted clip

hinge member can be opened or closed and said biasing spring can be moved to said second clamping position by said actuating means.

2. A device as claimed in claim 1 wherein said 70 actuating means for engaging the clip hinge member is a slidable tube within said elongated tube and movable in response to pressure applied to a trigger like lug slidably mounted on or adjacent said handle.

75 3. A device as claimed in claim 2 wherein said actuating tube is spring biased to a clip hinge member closing position.

4. A device as claimed in claim 2 or 3 wherein a releasable stop is provided to prevent rearward 80 movement of said actuating tube beyond a clip release position.

5. A device as claimed in claim 1 wherein the other actuating means is a slidable ram mounted within said actuating tube engageable with the clip 85 spring for axial movement to clamp the clip.

6. A device as claimed in claim 5 wherein said actuating ram extends back to the handle of the device and is engageable by the thumb of the hand holding the handle for said slidable movement 90 against the clip spring.

7. A device as claimed in any preceding claim when used for applying a clip as defined to a fallopian tube in a human female.

8. A tubal ligation device substantially as 95 hereinbefore described with reference to the accompanying drawing.

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